To work this apparatus it is necessary to take off the liquefying tube T and all the pieces of the upper part; also the lateral screw E′ and its tube A′; then, after having screwed on to the joint R the piece N, which serves as a stop-valve, the mercury should be turned dry and quite pure, into the wrought-iron reservoir B, up to the level of the edges N N′. The sides of this iron reservoir are very resistant and are able to support strong pressures.

The tube T having been filled with gas for liquefaction, it is gently forced into the mercury of the reservoir B; the part N being taken out, the mercury which flows out is collected. When the tube A rests on the leather of the bottom of the length of the reservoir, the screw E′ is re-screwed very tightly. The apparatus is inclined a little to get rid of the excess of mercury, in order that its level may remain below the lateral hole by which the pressure is introduced.

The support S with refrigerating envelope M is then re-screwed on the upper part of the *ajutage* A; it rests upon leather. The safety-bell-jar C is movable; it is intended to stop the pieces of glass should the tube T be broken. The stop-cock *r* lets the water flow from the envelope M. The lateral screw with the tube A′ is refixed, to which is soldered the small metallic tube T V, by which pressure is introduced.

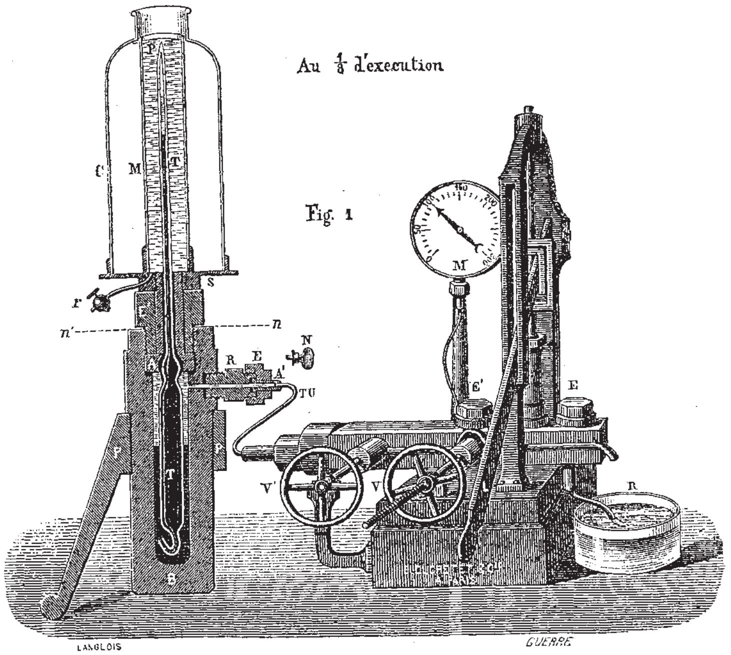
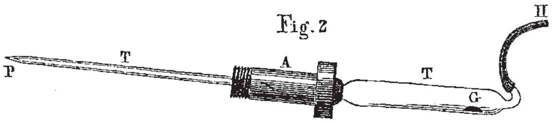


Fig. 2



The hydraulic pump, which Ducretet and Co. have constructed specially for this apparatus, is for the purpose of compressing water about the mercury contained in the reservoir. The two valves E E′ may be introduced by the orifices closed by the screws E E′; the valves may be thus tested and easily changed without undoing any part. The reservoir of water R is placed outside; it is then easily seen to and kept full.

Before setting the hydraulic pump to work, we withdraw as completely as possible the screw-plunger piston V by moving the fly-wheel. The action of the lever L enables us to obtain easily a pressure of 200 atmospheres. This pressure may then be increased by the gentle introduction of the plunger-piston V. The liquefying tube T is of thick glass; it has a resistance of about 400 atmospheres, but it is better not to exceed a pressure of 300 atmospheres. The second screw V′ is intended to produce expansion.

NOTES

ONE of the most effective methods of acquiring a headache is a good round of sightseeing, especially in a museum, collection, or picture-gallery; it is quite a comfort to get among a collection of any kind, the sight or catalogue of which does not make one ill by anticipation. Happily the headachy feature is generally absent from the collection of objects exhibited at the Royal Society *conversazioni*, and in this respect and because of its great interest, the collection brought together last Wednesday week was quite a model. Prof. Snellen's two modes of testing for colour-blindness ought to have been the first thing looked at, because then the guests would have been in a position to estimate the value of their observations. The inspection caused much amusement, and in some cases astonishment. The "Mechanical Chameleon," to exhibit the mixture of two colours in any proportion, was interesting, as was also Woodward's new rectangular prism illuminator, to be used with immersion lenses. The President's photographs of scenes and objects in the Rocky Mountains were specially attractive. Other objects which attracted considerable attention were—A large Holtz electric machine (by Ladd) consisting of twelve rotary and twelve stationary plates, thirty inches diameter, exhibited by Mr. W. Spottiswoode, Treas.R.S. A microspectroscope with improvements,—(1) quick movement of the slide carrying the slit; (2) scale for registering position of slit; (3) arrangement for comparing three spectra, and for splitting a single spectra; (4) new form of comparison stage, made by Mr. A. Hilger. A dynamo-electric machine, speed 800 revolutions, power 1·75 H.P. required to work it, effect 1,200 candles' light, exhibited by Messrs. Siemens Bros. The telephone harp, with visible records of sound through vacuum tubes, exhibited by Mr. F. A. Gower. Apparatus for showing figures in light from vibrations caused by sound, exhibited by Mr. Henry Edmunds. A metallic thermometer, invented by Mr. H. Bessemer; and apparatus for the automatic registration of the number of hours of sunlight, made for Kew Observatory, exhibited by Mr. J. Browning. A phoneidoscope, an instrument for observing the coloured figures reflected from liquid filters under the action of sonorous vibrations, made and exhibited by Tisley and Co. Composite portraits, made by combining the likenesses of different persons into a single resultant figure: (1) optically, (2) photographically, exhibited by Mr. Francis Galton, F.R.S.; we hope to publish a paper on the subject next week. We need not say that the phonograph in operation, under the superintendence of Mr. Preece, was specially attractive, and that Winkler's Lunar Landscape, and the beautiful photographs and paintings exhibited, lent a delightful variety to the collection.

THIS fine spring must render folks eager for their summer holidays, and many a plan must be thought over under its influence. Mr. Marshall Hall suggests that if one or two points and dates were fixed as rendezvous, mineralogists, geologists, botanists, entomologists, *et hoc genus omne*, might be very likely to accumulate and compare notes. For one such point Mr. Hall suggests the Hotel Bauer, at Sierre in the Valais, which can be reached in two day from London, *viâ* Paris, Pontarlier, Vallorbe, Lausanne, &c. For examination of the Lötchenthal and the Val d'Anniviers this would be a good place to start from, whilst travellers having mountain business could go about it north to the Oberland and south to the Pennine Alps. "If any other man knoweth a better place let him impart."

ANY ONE who has seen the graceful snout of a salmon or a trout, especially if he has looked upon it after an hour's exciting spin on a river or Highland loch, will be filled with disgust and, if an angler, with grief, on beholding the horrible head of a smolt figured in the *Gardeners' Chronicle* of May 4. It is positively loathsome. And this is the effect of the disease which has been proving so destructive to the helpless creatures in some of the Northern rivers, especially the Esk, Eden, Kent, and even the Tweed we believe. Mr. Worthington Smith has been making some inquiries into the nature of this disease which is killing not only salmon and trout, but eels, flounders, and other fish. He finds it to be a fungus (*Saprolegnia ferax*), which attacks mainly the head, tail, and fins. The scales appear to be covered with a fine white cottony bloom, which at length blinds the fish, envelops the gills, or even entirely closes the gills and mouth. Mr. Smith thinks the reason for the extraordinary abundance of the fungus this year is the unusual mildness of the winter. It seems only to attack the fish in fresh water, those in the estuaries escaping. We trust for the sake of our food supplies as well as on account of our genial friends the anglers, not to mention the poor fish themselves, that some means will be found of preventing the spread of the disease.

PROF. WIEDERSHEIM, of Freiberg University, writes us that through the kindness of Prof. Rutimeyer, he is in a position to describe a Labyrinthodont from the Trias, belonging to the palæontological collection at Basel. While hitherto nothing but the skull and some of the bony scales from the epidermis have been known, this specimen is completely preserved, whereby we obtain for the first time a full and clear insight into the organisation of the entire skeleton of this remarkable amphibian. But not only the skeleton with head, vertebral column, the shoulder and pelvis, down to the last phalanges of the fingers, are on view at the museum at Basel, but also a fine cast of the cranium and the spine, by which the extremely low organisation of the central nervous system of these animals is proved. Prof. Wiedersheim will publish a minute description of the remains in the Reports of the Swiss Palæontological Society.

AT the close of 1877 the amount subscribed for a statue to Linnæus was 44,276 Swedish crowns. This sum being insufficient, further contributions were obtained in Stockholm of 30,000 crowns, and the municipality of that city has undertaken to defray the expense of the pedestal and of the erection of the statue. The total sum available is estimated at 100,000 crowns (5,500*l*).

THE Berlin Ethnographical Museum has lately been enriched by a valuable collection of all the articles used by the two tribes of the Ostiacs and Samojedes in North Siberia. These objects were collected by Dr. Finsch during his voyage in 1876, and will soon possess no slight value, as the peculiarities of these people are rapidly vanishing in contact with Russian civilisation.

PROF. VON SIEBOLD, one of the oldest and best known of German zoologists, celebrated last week in Munich the fiftieth anniversary of his reception of the doctor's degree. The King of Bavaria presented him, on the occasion, with the cross of the Order of St. Michael; deputations were sent by the Munich University and Academy of Sciences, and greetings were sent by numerous foreign universities and societies.

THE Berlin Royal Academy of Sciences has granted the sum of 400 marks (20*l*.) to Dr. Ludwig Graff, Professor of Zoology at the Forest-Academy of Aschaffenburg, for the completion of his "Monograph of *Turbellaria*." Dr. Graff is now at work at the Zoological Station of Naples.

AT the annual meeting of the Royal Institution of Great Britain the Annual Report of the Committee of Visitors for the year 1877, testifying to the continued prosperity and efficient management of the Institution was read and adopted. During the last twenty-five years the number of members paying annually (five guineas) has increased from 344 to 544. The real and funded property now amounts to above 84,500*l*., entirely derived from the contributions and donations of the members. Forty-one new members paid their admission fees in 1877. The principal officers were-re-elected.

AT a special general meeting of the Birmingham Natural History and Microscopical Society, held on the 30th ult., Dr. Cobbold, F.R.S., was unanimously elected an honorary vice-president of the Society.

M. F. SOENSON has presented to the Swedish Academy the results of his experiments on the electric conductivity of solutions of various alums. These show that in all cases the conductivity increases directly with the concentration of the solution, and that while less intense than in solutions of the simple alkaline sulphates, it is always more intense than in solutions of aluminium sulphate. The green modification of chrome-alum possesses a greater conductivity than the red variety.

THE French Association for the Progress of Sciences is preparing for its next session, which will take place on August 28 at Paris. The Bureau has been completed and is composed as follows:—President, M. Fremy, Professor of Chemistry at the Polytechnic School and Museum of Natural History; Vice-president, M. Bardoux, the Minister of Public Instruction; Secretary, M. Perrier, of the staff, Director of the Ordnance Survey, Member of the Bureau des Longitudes, and Council of the Observatory; Vice-secretary, M. Comte Saporta, Correspondent of the Institute; Treasurer, M. Masson, the scientific publisher; Secretary of the Council, M. Gariel, Engineer of Ponts et Chaussées. The session will take place at the École des Beaux Arts, a very extensive building containing many magnificent rooms for sections. For all inquiries relating to the Paris meeting letters must be directed to M. Gariel, Secretary of Council, 76, rue de Rennes, Paris.

AT the general monthly meeting of the Royal Institution of Great Britain, the Secretary announced that the managers had granted the use of the lecture-theatre to the Sanitary Institute of Great Britain for their anniversary meeting on July 3 at 3 o'clock, when an address would be given by Mr. Frank Buckland, M.A., on "The Pollution of Rivers, and its Effects upon the Fisheries and the Supply of Water to Towns and Villages."

MESSRS. BLACKWOOD have published a fifth edition of Prof. H. A. Nicholson's "Manual of Zoology." While the plan of the work is essentially the same as in former editions, the entire work, the author states, has been submitted to careful revision, and large portions of it have been almost entirely rewritten.

A COMMITTEE has already been formed in Holland, under the presidency of Prince Alexander of the Netherlands, to celebrate, in a fitting manner, the 300th anniversary of the eminent philosopher and statesman, Hugo de Groot, who was born on April 10, 1583.

A MEDALLION representing M. Thenard, the celebrated professor of chemistry, who was during a long time Dean of the Faculty of Sciences and Chancellor of the Paris University, has been sculptured on the walls of the Sorbonne courtyard. It was inaugurated on the occasion of the meeting of the Sociétés Savants. It bears the date of 1877, the centennial year of M. Thenard's nativity. M. Thenard died in 1857.

THE Jardin d'Acclimatation at Paris has just succceeded in obtaining an East Indian tapir, an animal rarely found in European collections, although the South American variety is comparatively common.

AN interesting work has just appeared in Stuttgart from the pen of Dr. R. Andree, on "Ethnographic Parallels and Comparisons." The author has chosen over twenty various subjects, and has gathered together on these topics an enormous amount of material from all the races on the globe. Among these subjects are constellations, cairns, measures of value, mothers-in-law, the vampyre, skull worship, the umbrella as mark of dignity, &c. In view of the rapid invasions of European culture in every direction, the author considers it of the utmost importance to complete as rapidly as possible the collection of all objects necessary to preserve a complete picture of the material and intellectual condition of the uncivilised peoples now existing.

MR. LUGGER, the curator of the Maryland Academy of Sciences, left Baltimore on April 4 for the purpose of prosecuting explorations in the West Indies and in Demerara in behalf of the Academy. In the course of his mission he will endeavour to procure living plants for the conservatory of Druid Hill Park and material for the zoological investigations of the Johns Hopkins University.

DESPITE numerous misfortunes, Berlin still continues to surpass all other European cities in its collection of anthropoid apes. The Zoological Gardens have just received from Borneo a healthy pair of orang-outangs, which, added to the one already in their possession, make an exhibition of rare interest.

ON the evening of April 23 Vesuvius showed signs of internal disturbance, sending up a column of flame at short intervals from the crater.

A FRENCH physician, Dr. Quimus, has lately made an elaborate study of a new disease, prevalent among telegraphic *employées*, and closely resembling writers' cramp. It is more common among the female operators.

FROM the last quarterly list of the members of the Institution of Civil Engineers, we gather that this increasing body now consists of 1,033 members, 1,759 associates, and 16 honorary members, together 2,808; besides a class of students attached numbering 520.

THE German Fischerei-Verein, of the activity of which we have made frequent mention, is engaged now in introducing the Californian salmon extensively into German waters. Of 300,000 eggs sent across the ocean, 25,000 arrived in good condition, and the resultant fish have been divided between the rivers of the Danube valley and those of the Rhine. 300,000 young eels from Normandy are being introduced into the Prussian streams.

AMONGST the few halls of the Paris Exhibition which can be considered as quite ready we must notice the excellent school exhibition of the City of Paris, which is situated in the central part of the palace.

A NEW remedy for diarrhœa in men and animals is said to have been discovered in New Zealand, where it has long been in use among the Maories. It consists in a decoction made by pouring boiling water on the green leaves of a shrub called roromiko by the natives. The liquid, though slightly bitter, is said to be not unpleasant to the taste. It is asserted that two doses of this decoction will always effect a cure even in bad cases.

A JAPANESE (native) paper states that a resident at Osaka has been endeavouring to manufacture oil from crude camphor, for which purpose he has built a large factory in that town. The oil he makes is described as being cheaper and better for purposes of illumination than kerosene.

ONE of the curiosities of industry, according to the *Japan Herald*, is the manufacture of boots by the Japanese for sale in the United States, a trade which is of quite recent origin, but has already attained considerable proportions. Oddly enough most of the leather used is imported into Japan from the United States.

A PRODUCT of the South Sea Islands, "copra" which is the dried kernel of the cocoa-nut, is being turned to a new account. Hitherto it has only been used for making oil, but now it has been discovered that the residue, after that process, is valuable as food for cattle and sheep.

THERE have been not a few signs recently that Spain is awakening from her long lethargy with regard to progress of all kinds, and one more comes to us in Nos. 6 to 25 (with the exception of No. 13, which has not come to hand), of the *Boletín de la Institucion Libre de Enseñanza* (Madrid), which make us acquainted with the Proceedings down to February 28. These recent numbers give us information as to the rules and objects of the Institution. By Article 1 the Institution is "Consagrada al cultivo y propagacion de la ciencia en sus diversos órdenes." By Art. 3 the number of Fellows is unlimited. By Art. 15 "La *Institucion* es completamente ajena á todo espiritu é interés de comunion religiosa, escuela filosófica ó partido político; proclamando tan solo el principio de la libertad é inviolabilidad de la ciencia y de la consiguiente independencia de su indagacion y exposicion respecto de cualquiera otra autoridad que la de la propria conciencia del Profesor, único responsable de sus doctrinas. Art. 16: La Institucion establecerá, segun lo permitan las circumstancias y los medios de que pueda disponer: 1. Estudios de cultura general (ó de segunda Enseñanza) y profesionales, con los efectos académicos que les concedan las leyes del Estado; 2.

Estudios superiores científicos; 3. Conferencias y cursos breves de carácter, ya científico, ya popular; 4. Una biblioteca y los Gabinetes dotados del material correspondiente; 5. Un boletin para publicar sus documentos oficiales y trabajos científicos; 6. Concursos y prémios, y cuanto contribuya á promover la cultura general y sus propios fines." These extracts from the statutes, ratified May 31, 1876, will sufficiently show the aims of the Institution, and show also what is being done for the cultivation of science in Madrid. Running through Nos. 10–15, 18–21, is a list of 728 shells, in the natural history cabinet, arranged on the method of Dr. Woodward's "Manual of Conchology," and in Nos. 22, 23 are catalogues of plants in herbaria from the Province of Avila and from the Philippine Islands. In Nos. 24, 25, a classification of rock specimens. The contents of the several numbers are of the same general character as we indicated in our former notice. The papers on Haeckel's morphology are continued, and the same professor (A. G. de Linares) has papers on the classification of geometrical figures, and on some recent publications on crystallography and mineralogy. The syllabuses are given of courses of lectures on two or three languages, on mathematics (arithmetic and synthetic geometry) and other subjects. We can only wish success to this the first (we believe) society, of the kind that has been formed in Spain.

NO plant perhaps has a more varied adaptation than the bamboo. In every country where these gigantic grasses grow they are put to a multitude of uses. It is not then because the bamboo is incapable of being converted to any other use that so much attention has been given to it of late with the view of turning it into a source of supply for paper material. It is more on account of its rapid growth, the ease with which it can be propagated and its abundant yield, together with its wide geographical range, that such interest has been roused in it, for the several species of bamboo are found in most tropical parts of the world. If, however, it should become a regularly recognised paper material there is no doubt that our supplies would be obtained chiefly from the East and West Indies. With regard to its growth in the latter country there seems to be a prospect that it may prove successful for cultivation in plantations specially formed for growing the plants for paper stock. There are, of course, extensive natural resources of bamboo, but it is thought that by cultivation and a system of irrigation the yield would be greatly increased and the cost of keeping up such a plantation would, after the first two years, be almost *nil*. It is by no means improbable that the bamboo will in the course of time become an important paper-making commodity.

A STRANGE meteorological phenomenon was recently observed at Logelbach, in Upper Alsatia. The rising sun seemed to be surrounded by a vast column of fire. An eye-witness describes the occurrence in *La Nature*. When he began his observations, the column had already reached a height of 25 or 28 degrees. Its breadth remained constant, and amounted to 2 or 2½ degrees. Its colour was greyish red, and at its upper end orange; the dull and cloudy sky formed a fine contrast with the brilliant phenomenon. From 6.30 A.M. till 7 o'clock its brilliancy remained much the same, while its extent towards the west increased by about 4 or 5 degrees. At 7 o'clock the sun's disc appeared above the horizon, and its tint was an intense red. The whole sky now seemed to be a gigantic rainbow, all the shades of which appeared in horizontal layers, forming a splendid background to the bright red and orange vertical column. A minute later the sun lost its red tint and the column gradually decreased; for five minutes it formed a band of 5 degrees in height, and then disappeared altogether.

DECADE V. of the "Prodromus of the Palæontology of Victoria," by Mr. Frederick McCoy, of the Geological Survey of Victoria, deals, by means of well-executed lithographic illustrations and text, with numerous fossils of the tertiary and Upper and Lower Silurian formations.

THE recent numbers (26-31) of Bentley and Trimen's "Medicinal Plants" fully maintain the excellence of the earlier ones. Among the admirable plates of well-known plants in these numbers may be mentioned those of *Aconitum ferox;* the opium-poppy, *Papaver somniferum;* the liquorice, *Glycyrrhiza glabra;* the indigo, *Indigofera tinctoria;* the camphor, *Cinnamonum camphora;* and the sabine, *Juniperus sabina*. The only one in these numbers which does not strike us as so happy, is that of the common marjoram, *Origanum vulgare*.

WE regret that the name of M. Milne-Edwards somehow got among the catalogue of the eminent men whom we named last week as having gone over to the majority during the existence of NATURE. We are glad to say that M. Milne-Edwards, though as old as the century, is as active as ever.

THE addition to the Zoological Society's Gardens during the past week include a Lion (*Felis leo*) from Africa, presented by Mr. J. D. Massey; a Vervet Monkey (*Cercopithecus lalandii*) from South Africa, presented by Mr. G. W. Twining; a Macacque Monkey (*Macacus cynomologus*) from India, presented by Mr. J. M. Neil; a Black-eared Marmoset (*Hapale penicillata*) from South-East Brazil, presented by Mr. Walter M. St. Aubyn; a Common Cormorant (*Phalacrocorax carbo*), European, presented by Lord Braybrooke; four Green Lizards (*Lacerta viridis*) from the Isle of Jersey, presented by Mr. F. E. Lawder; a Black Ape (*Cynopithecus niger*) from the Celebes, a Brazilian Tree Porcupine (*Sphingurus prehensilis*) from South America, deposited; two Lesser Birds of Paradise (*Paradisea papuana*) from New Guinea, two Black Storks (*Ciconia niger*) European, purchased; two Black-faced Spider Monkeys (*Ateles ater*) from East Peru; a Common Cassowary (*Casuarius galeatus*) from Ceram, a Golden-winged Woodpecker (*Colaptes auratus*) from North America, received in exchange; a Great Kangaroo (*Macropus giganteus*), an Eland (*Oreas canna*) born in the Gardens.

ACADEMIC LIBERTY IN GERMAN UNIVERSITIES[1]

IN taking possession of the high functions to which the vote of my colleagues has raised me, my first duty is to renew here, publicly, the expression of my thanks towards those who have given me this proof of their confidence. Its value is all the greater in my eyes because it has been given to me notwithstanding the few years I have passed among you and notwithstanding my function of professor in the natural sciences which form, in the curriculum of university education, a foreign element, the introduction of which has caused the modification of several points in the ancient organisation of the faculties, and will yet induce others in the future. The department of physics to which I have devoted myself is exactly that which contains the theoretical foundations of all the other branches of the natural sciences, and which presents in the most striking form the characteristic features of their methods. Thus I have several times already been compelled to propose to the University modifications in the rules previously followed, and I have had the pleasure of being always backed by the hearty support of my colleagues and the University Senate. Since you have chosen me to direct the University during the course of the next year, it is a proof, in my eyes, that you do not regard me as a rash innovator.

The object, the method, the immediate aim of the natural sciences may at first sight appear altogether distinct from those of the moral sciences; it seems to men accustomed to occupy themselves exclusively with the immediate expression and the proofs of the intellectual life, that they have nothing to learn from the results of these sciences, and that they have for them only a remote interest. But, in reality, as I have already

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[1] Rectorial Address of Prof. Helmholtz, F.R.S., at the University o Berlin.